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GRC Environmental Programs Manual—Chapter 22

Aboveground Storage Tanks

Approved by Energy and Environmental Management Office Chief

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Change Record

Revision	Effective Date	Expiration Date	C-25, Change Request #	Description
A	4/2015	4/2020		Updated all form links to reflect the NASA Electronic Form portal. Corrected several form names.

***Include all information for each revision. Do not remove old revision data. Add new rows to table when space runs out by pressing the tab key in the last row, far right column.*

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Chapter 22.—Aboveground Storage Tanks

For the bulk storage of oils and petroleum-based fuels only

***NOTE:** This chapter is maintained and approved by the Energy and Environmental Management Office (EEMO). The last revision date of this chapter was March 2015. The current version is maintained on the Glenn Research Center internet at <http://www.grc.nasa.gov/WWW/FTD/EEMO/index.html>. Approved by: Chief of Energy and Environmental Management Office.*

1.0 PURPOSE

This chapter establishes policy and procedures and assigns responsibilities for the installation, use, maintenance, and emergency response related to both indoor and outdoor equipment and systems that utilize aboveground bulk storage containers also known as aboveground storage tanks (ASTs).

All Glenn Research Center (GRC) tenant, resident support service contractor employees, and construction contractors involved in the use of ASTs and their contents are to be informed that their lives and health may depend on their knowledge of the fuels and oils they work with. These responsibilities include proper handling procedures, the requirements of wearing appropriate protective clothing and equipment as required, the awareness of the consequences of a release or spill from ASTs, and the measures to prevent such occurrences.

2.0 APPLICABILITY

This chapter is applicable to all personnel who utilize either indoor and/or outdoor ASTs of 55 gal and/or larger to store bulk amounts of oils such as lube oils, hydraulic oils, used oils, and cooking oils. This chapter is also applicable to the bulk storage of petroleum-based products such as diesel fuel, jet fuel, unleaded gasoline, and E-85 ethanol located at GRC sites and to any NASA-controlled, Government-owned facilities associated with GRC. This includes mobile fuel dewars and transfer tanks as well as mobile backup generators. For the purposes of this chapter, the term AST includes all bulk storage containers of 55 gal and larger of oil or fuel as listed in this section. Oil-filled operating equipment (i.e., hydraulic and lube systems), electrical equipment (i.e., transformers), and vehicle fuel tanks for purposes solely for operation of the vehicle are exempt from the policies set forth in this chapter. The Center's approved Spill Prevention Control and Countermeasures (SPCC) plan located within the respective Center's integrated contingency plan (ICP) shall be referenced for requirements pertaining to those exempt systems.

3.0 BACKGROUND

Originally published in 1973 under the authority of Section 311 of the Clean Water Act, the Oil Pollution Prevention regulations set forth requirements for prevention of, preparedness for, and response to oil discharges at specific nontransportation-related facilities. To prevent oil from reaching navigable waters and adjoining shorelines, and to contain discharges of oil, the regulation requires these facilities to develop SPCC plans and establish procedures, methods, and equipment requirements.

4.0 POLICY

It is GRC policy to follow the requirements and recommendations of all relevant Federal, state, and local regulations applicable to ASTs. The complete regulatory texts should be consulted for further details. The following are the authorities that presently regulate ASTs at GRC and are incorporated here by reference.

1. Flammable and Combustible Liquid Standard 29 Code of Federal Regulations (CFR) 1910.106
 - a. The Occupational Safety and Health Administration (OSHA) has enacted regulations applicable to flammable and combustible liquids used in the workplace. These regulations specify the special precautions that shall be taken to ensure that flammable and combustible liquids are handled and stored safely.
2. National Fire Protection Association (NFPA) Codes 30 and 30A
 - a. These codes apply to the storage, handling, and use of flammable and combustible liquids, including waste liquids. NFPA Code 30A applies to the use of ASTs at motor fuel dispensing facilities, fleet vehicle motor fuel dispensing facilities, and aircraft refueling.

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3. National Pollutant Discharge Elimination System (NPDES)/Storm Water Permit Regulations 40 CFR 122
 - a. This regulation requires a permit for storm water runoff. It addresses pollution in precipitation runoff that is discharged from certain industrial sites, construction sites disturbing an area of 1 acre or more, and urban storm sewers.
 - b. Regulations are applicable to releases of contaminated rain or snow melt from secondary containments into navigable waters of the United States.
4. Ohio Fire Code, Chapter 28
 - a. The Ohio Fire Code addresses prevention, control, and mitigation of dangerous conditions related to the storage, use, dispensing, mixing, and handling of flammable and combustible liquids.
 - b. The code is applicable to the permit process used by the state Fire Marshal for tanks that are installed, removed, repaired, or altered in any way.
5. Oil Pollution Prevention, 40 CFR 112
 - a. This regulation is applicable to facilities with over 1320 gal of aboveground oil storage capacity and determined by counting only containers of oil with capacities of 55 gal or greater.
 - b. Facilities subject to this rule must prepare and implement a plan to prevent any discharge of oil into or upon navigable waters of the United States or adjoining shorelines.
 - c. This rule provides the policies and procedures to prevent, control, and administer countermeasures to oil spills.
6. OSHA, Hazard Communication Standard 29 CFR 1910.1200
 - a. This standard mandates that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring.
 - b. The standard is applicable to any chemical that could constitute a health or physical hazard to employees in the workplace.

5.0 RESPONSIBILITIES

5.1 Air Programs Manager

The Air Programs Manager is responsible for GRC compliance with the Title V Permit and ensures all sources of air emissions are documented and permitted as required.

5.2 All GRC Personnel

Any person who discovers a spill at Lewis Field shall immediately notify Emergency Dispatch on a GRC in-house line (911). If using a cellular phone, dial 216-433-8888 and not 911; when at Plum Brook Station, call 419-621-3222.

5.3 AST Program Leads

The AST Program Leads implement and maintain the AST Program at either Lewis Field or Plum Brook Station such that the installations are in compliance with the Oil Pollution Prevention Act and applicable provisions of their respective ICPs.

5.4 Authority Having Jurisdiction

The authority having jurisdiction (AHJ) is responsible for providing review and approval on changes made to facilities and systems that affect fire protection and life safety, including model building and fire code (International Code Council) and local (Ohio Fire Code) requirements. The AHJ has the authority to enforce the fire code where these requirements originate.

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5.5 Human Capital Development Branch Chief

The Human Capital Development Branch Chief is responsible for the maintenance of training records of GRC personnel for SATERN-based training sessions.

5.6 Chemical Management Lead

The Chemical Management Lead ensures that the requirements of 29 CFR 1910.1200, the Hazard Communication Standard, and the policies and procedures of GRC are met with regards to the bulk storage of oil of any kind or in any form at either Lewis Field or Plum Brook Station.

5.7 Fuel Distribution Supervisor

The Fuel Distribution Supervisor verifies that employees who are involved in the transfer of fuel at GRC are required to comply with Glenn Work Instruction No. **GLWI-CO-6000.001**. These employees are also required to comply with the applicable provisions of their respective ICPs at either Lewis Field or Plum Brook Station.

5.8 Civil Systems Manager

The Civil Systems Manager assists in verifying that the design aspects related to the modification, replacement, or repair of existing or new AST systems at Lewis Field or Plum Brook Station meet the requirements of their respective ICPs.

5.9 Tank Site Managers

Tank Site Managers are responsible for the operation, maintenance, monthly inspections, and overall management of the ASTs under their use and supervision at either Lewis Field or Plum Brook Station per details outlined in their respective ICPs.

6.0 REQUIREMENTS

6.1 Oil Pollution Prevention (*40 CFR 112*)

6.1.1 Annual Training

All personnel who utilize, deliver, and store petroleum-based products are required to annually complete the SATERN Course number GRC-006-08 for SPCC and ASTs Training. At Plum Brook Station, the trainings are modified versions of the Lewis Field SATERN modules and are taught via presentations either in class or on an individual's computer.

6.1.2 AST and Piping Integrity Testing

Inspection and testing of ASTs must be done as part of a program developed by a licensed Professional Engineer (PE). The PE determines the appropriate industry standards to be applied, consults with facility personnel, and reviews the facility to determine the frequency, type of testing and inspections and the appropriate qualifications for personnel performing the tests and inspections. The PE considers factors such as type of tanks, age and condition of the tanks, materials contained in the tanks, proximity to waterways, etc. The resulting inspection and testing procedures and schedules are then incorporated into the facility's Spill Prevention Control and Countermeasures (SPCC) plan. GRC's SPCC plan is referred to as the Integrated Contingency Plan (ICP). For detailed information about GRC's inspection and testing requirements see Section G of the ICP.

The two most common industry standards that the PE uses to determine the nature and frequency of tank inspections and testing are American Petroleum Institute (API) Standard 653 and Steel Tank Institute (STI) "SP001 Standard SP001. API Standard 653 (API-653) covers steel storage tanks built to design specifications in the API 650 standard and its predecessor API12. It provides minimum requirements for maintaining the integrity of tanks after they have been placed in service and addresses inspection, repair, alteration, relocation, and reconstruction. This standard is typically used to establish an integrity testing program for field-erected tanks. Go to the API website (<http://www.api.org/>) for more information on these standards. STI Standard SP001 (STI SP001) focuses primarily on inspection of welded, metal, shop-fabricated and small field-erected tanks. Also included is the inspection of smaller, portable containers such as 55-gallon drums, intermediate bulk containers (IBCs) and other such containers

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that may be of metal or plastic construction. Go to the STI website (<http://www.steeltank.com/>) for more information on these standards. Examples of integrity inspections and testing include, but are not limited to: visual inspection, radiographic examination, UT, MFL scanning, helium leak testing, magnetic particle examination, liquid penetrant examination, acoustic emissions testing, hydrostatic testing, inert gas leak testing or other methods of non-destructive examination. Acoustic emission testing and UT robotic measurement are non-destructive examination methods that can be used while the tank is in-service. Acoustic emission testing is used to determine if there is a leak but does not determine if there is corrosion or metal loss. Hydrostatic testing is typically performed on new tanks and on existing tanks that have had major repairs or alterations. Industry standards may use one, or a combination, of these non-destructive examination methods or tests as part of an integrity testing program.

6.1.3 Operator Monthly AST Inspections

AST operators or designated Tank Site Managers are required to complete monthly inspections of the ASTs under their responsibility. Inspections shall be documented on the SHeD-provided site-specific Monthly Inspection Forms and include indoor, outdoor, tank, or drum requirements and located either at the AST site or other location made known to the AST Program Lead for either Lewis Field or Plum Brook Station. See Appendix B, Sections B.2 and B.3, for examples of the monthly and facility inspection forms.

6.1.4 Secondary Containment

For indoor ASTs, containment shall be adequately sized to contain 100 percent of the maximum storage capacity or documented operating capacity of the AST. For exterior ASTs, containment shall be adequately sized to contain 110 percent of the container plus precipitation if not a double-walled tank. Containments shall be drained on a frequent basis to maintain the required containment capacity.

SHeD shall be notified to complete and document the inspection and emptying of secondary containments susceptible to rain and snow accumulations. No GRC personnel shall discharge water accumulations from secondary containments without first receiving SHeD approval. All active ASTs with secondary containment drain valves shall be kept in the closed position and locked if feasible.

6.1.5 Site Spill Response Plan (40 CFR 112)

At AST locations where an Impracticability Determination Provision is utilized because of adequate secondary containment not being feasible, the operators of the AST shall prepare a Site Spill Response Plan detailing the commitment of manpower, equipment, along with the actions to be initiated in the event of a major spill or release from the AST System. These plans shall be reviewed and approved by the AST Program Lead at Lewis Field or Plum Brook Station and incorporated in the respective ICP.

6.1.6 Spill Kits (40 CFR 112)

Spill kits shall be onsite and in line of sight of the AST(s) the kit has been designated for. AST operators and/or designated Tank Site Manager are required to supply and replenish these spill kits.

6.2 Fire Protection (29 CFR 1910.1200, 29 CFR 1910.106, NFPA 30A, Ohio Fire Code)

Container grounding and venting shall be implemented as required. The appropriately rated fire extinguisher shall be not less than 10 ft or more than 50 ft from the AST(s). Bollards and other AST protection measures shall be in place prior to use. The location and fire protection requirements of new tanks shall be reviewed by the GRC AHJ.

6.3 Overfill Protection and Spill Buckets (NFPA 30A and 40 CFR 122)

All ASTs that are periodically replenished shall have a direct-view level gauge or built-in flow restrictor, or overfill alarm present to notify or prevent delivery personnel from overfilling the AST. Measures such as a spill bucket shall be present at the fill ports to contain drips and spills during and after deliveries and the detachment of hose connections.

6.4 Permitting (NFPA 30A and Ohio Fire Code Chapter 28, Title V Air Permits)

Permits from the Brook Park Fire Department and/or approval from the GRC AHJ are required prior to tank repairs, modifications, new installations, change in service, and removal.

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ASTs containing 600 gal or more of flammable and combustible liquids shall be coordinated with the SHed Air Program Manager for permitting requirements.

6.5 Superfund Amendments and Reauthorization Act (SARA) Reporting

The SHed Operations Team annually requests hazardous material information from the AST Program Lead for the Emergency Planning and Community Right-To-Know Act (EPCRA).

6.6 Tank and Container Signage (29 CFR 1910.1200, Ohio Fire Code)

All ASTs shall be properly labeled with the name of the contents, NFPA placard or label, a unique tank identification (designated by AST Program Lead for Lewis Field or Plum Brook Station), and have emergency contact information where the AST is being stored.

7.0 RECORDS

- Completed annual sets of the monthly AST site inspection forms.—Maintained by the designated Tank Site Manager with past year's records maintained by the respective Center's AST Lead.
- SHed annual AST inspection and/or audit forms.—Maintained by the respective Center's AST Lead.
- Tank Site Manager designation lists and AST database.—Maintained by the respective Center's AST Lead.
- Tank integrity test results where applicable.—Maintained by the respective Center's AST Lead.

8.0 REFERENCES

Document number	Document Name
29 CFR 1910.106	Occupational Safety and Health Administration (OSHA) Flammable and Combustible Liquid Standard
29 CFR 1910.1200	OSHA Hazard Communication Standard
40 CFR 112	Oil Pollution Prevention
40 CFR 122	National Pollutant Discharge Elimination System (NPDES)/Storm Water Permit Regulations
2005 Ohio Fire Code, OAC 1301:7-7-34	Flammable and Combustible Liquids
GLM-FE-8500.1-8	Environmental Programs Manual, Chapter 8, Spill Control
NFPA Codes 30 and 30A	Flammable and Combustible Liquids, Code for Motor Fuel Dispensing Facilities, Repair Garages, and Aircraft Refueling

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APPENDIX A.—DEFINITIONS AND ACRONYMS

Aboveground storage tank (AST).—All containers whether plastic, steel, fiberglass, or other composite with a storage capacity of 55 gal. or larger utilized for the storage of petroleum-based products such as oils, fuels, greases, and coolants. Pressurized vessels of liquid oxygen, nitrogen, and other similar liquid gases are exempt.

Authority having jurisdiction (AHJ)

Bulk storage containers.—Any container used to store oil. These containers are used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce.

Code of Federal Regulations (CFR)

Combustible liquid.—A liquid having a cup flash point at or above 100 °F and subdivided as follows:

- Class II, liquids having a closed-cup flash point at or above 100 °F and below 140 °F
- Class IIIA, liquids having a closed-cup flash point at or above 140 °F and below 200 °F
- Class IIIB, liquids having a closed-cup flash point at or above 200 °F

Continuous release detection method (CRDM).—Means of detecting a release of liquid through inherent design. It is a passive measure as it does not require sensors or power to operate. Liquid releases are visually detected by facility operators. Secondary containment is considered a widely accepted CRDM system.

Double-walled interstice.—The space between the primary tank and the secondary tank to prevent a release from the primary tank from entering the environment. Most have a sight glass or separate level gauge for detecting a release in the interstice.

Emergency Planning and Community Right-to-Know Act (EPCRA)

Flammable liquid.—A liquid having a closed-cup flash point below 100 °F, and are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

- Class IA, liquids having a flashpoint below 73 °F and a boiling point below 100 °F
- Class IB, liquids having a flashpoint below 73 °F and a boiling point at or above 100 °F
- Class IC, liquids having a flashpoint at or above 73 °F and a boiling point below 100 °F

Glenn Research Center (GRC)

Glenn Work Instruction (GLWI)

Impracticability determination provision.—Per Spill Prevention Control and Countermeasures guidelines, when a facility owner or operator is incapable of installing secondary containment by any reasonable method.

Integrated contingency plan (ICP).—Plan intended to be used by facilities to prepare emergency response plans for responding to releases of oil and nonradiological hazardous substances. The ICP creates one functional emergency response plan by consolidating plans necessary to comply with multiple regulations.

National Fire Protection Association (NFPA).—The mission of the NFPA is to reduce the worldwide crisis of fire and other hazards on the quality of life by providing and promoting codes and standards.

National Pollutant Discharge Elimination System (NPDES)

Nondestructive examination (NDE).—The development and application of technical methods to examine materials and/or components in ways that do not impair future usefulness and serviceability in order to detect, locate, measure, interpret, and evaluate flaws in the shell of a tank.

Ohio Administrative Code (OAC)

Oil.—Oil of any kind or in any form, including but not limited to fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil.

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Oil-filled equipment.—Oil-filled electrical, operating, and manufacturing equipment, excluding bulk storage containers. Examples of oil-filled operational equipment include hydraulic systems, lubricating systems (including lubricating systems for pumps, compressors, and other rotating equipment), gear boxes, machining coolant systems, heat transfer systems, transformers, other electrical equipment, and other systems containing oil to enable operation.

Safety, Health and Environmental Division (SHED)

Superfund Amendments and Reauthorization Act (SARA)

System for Administration, Training and Educational Resources for NASA (SATERN)

Spill Prevention Control and Countermeasure (SPCC) plan.—Facilities subject to 40 CFR 112 must prepare and implement a plan to prevent any discharge of oil into or upon navigable waters of the United States. The SPCC is incorporated into the respective ICPs for both Lewis Field and Plum Brook Station.

Tank integrity test.—Test of the shell integrity of the aboveground storage tank by several different means including ultrasound, water tightness, smoke tests, and certified visual inspection following industry standards. All tests are to detect weaknesses in the tank shell or signs of excessive corrosion and tank shell loss.

Tank Site Manager.—The Tank Site Manager is responsible for the operation, maintenance, and overall management of the aboveground storage tanks under their use and supervision.

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APPENDIX B.—EXAMPLES OF FORMS

B.1 Example: SHeD Annual Aboveground Storage Tank Site Inspection/Audit Forms

NASA Glenn Research Center at Lewis Field SHED Aboveground Storage Tank/Drum Annual Inspection Form

Date of Inspection: _____ SHED Inspector Name: _____

Building No. and Description: _____

Tank ID or Drum Location: _____

Tank, Drum, and Piping Related:	Yes	No	NA
1. NFPA Label, Unique ID, and Tank Content Labeling exist and are appropriate for the product stored?			
2. Tank level gauge is present and is operating or reading tank levels correctly?			
3. Double walled tanks are free of liquid in the interstice?			
4. Spill baskets on fill ports are free of product, water, and debris?			
5. Tank vents appear unblocked by insect nests, other obstructions and are free of damage?			
6. The tank is free of excessive corrosion, distortion, and dents or bulging?			
7. The tank is free of signs of leaks, drips, or a potential for release?			
8. The associated piping is free of leaks, damage, wet fittings, bowing, or excessive corrosion?			
9. Tank foundation is free of settling, cracks, or damage by plant roots?			
10. Tank access free of obstructions and ladders and supports are in satisfactory condition?			
11. Drums are labeled with contents?			
12. Drums are undamaged, free of corrosion and lids or ports are securely fastened?			
Containment Related:	Yes	No	NA
13. Secondary containment is free of damage or breeches in the containment wall, berm or curbing?			
14. Drums are in appropriately sized containments or placed on adequately sized spill pallets?			
15. Secondary containment drain valve is operational and kept in the closed position?			
16. Secondary containment is free of product, water, and/or debris?			
17. Secondary containment is free of equipment or containers that may reduce the size of the containment?			
18. Hazardous or incompatible chemical or product storage is not present in the same containment?			
19. Spill containments with bladders are free obstructions and undeployed?			
Spill / Fire Response Related:	Yes	No	NA
20. Spill Kit is in-line-of-sight of tank or drums and adequately stocked?			
21. Spill kit ID matches EMB records for the site?			
22. Fire Extinguisher is within 30 feet of site and in-line-of-sight or a sign is posted to its location?			
23. Emergency contact information is posted in the building and available to all personnel?			
Operator Related:	Yes	No	NA
24. Operator is completing monthly inspections properly and is keeping them on-site?			
25. Operator is addressing leaks, damage, or other noted concerns in a prompt manner?			
26. Operator has notified EMB of changes in use of the tank, major repairs, or major modifications?			
27. Operator has notified EMB of new tanks or drum storage requirements and locations?			

See reverse side for additional comments/findings as needed.

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B.2 Example: Monthly Inspection Form all ASTs at Lewis Field and Only Outdoor ASTs at Plum Brook Station

NASA Glenn Research Center at Lewis Field

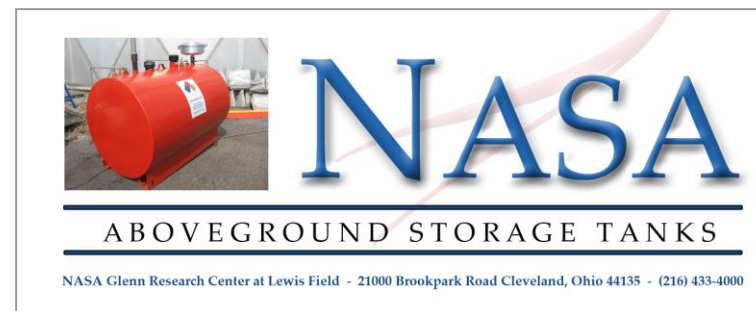
Aboveground Petroleum Storage Tank

Monthly Inspection Form:

Tanks to be inspected:

● AST-XXX ● 55 gallon drums

Attention Designated Tank Inspector: Please answer YES (Y or ✓) or No (N or X) for the following questions and state corrective actions to be taken for those items marked with an **N** or **X**. Please add your initials in the last box with the corrective actions required. Use the reverse side of this form to notate concerns/observations.



Date	Spill Kit Present and Stocked?	Fire Ext. Present?	Tank and drums are free of leaks, corrosion, and bowing?	Supply and return piping and connections are free of leaks, corrosion, and bowing?	Tank foundation and supports are free of cracks, settling, and corrosion?	Secondary containments are free of damage, product, and debris?	Tank level gauges, or high level alarms are in good working condition?	Tank Labels and NFPA Placards Present?	Corrective Actions and Inspector Initials

Keep this document at the tank site at a designated area for the Environmental Management Branch collection.

Contact SHeD at 3-8441 or 3-8764 for questions regarding this document or the tanks being inspected.

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B.3 Example: Excerpt of the Indoor Monthly AST and Drum Inspection Form Utilized at Plum Brook Station

SPF Facility (INTERNAL) Safety Inspection Checklist					
Building Number: 1411			Date: _____		
23.0 Hazard Communication Program (29 CFR 1910.1200)					
HA02	23.0 Are MSDS available for the chemicals present?	Yes	No	N/A	SC Location/Comments
HA03	23.0 Are chemicals properly stored in properly labeled containers?				
I Spill Prevention, Control & Countermeasure (40 CFR 112.8 (c) (6))					
	Visual inspection of oil containers, Note: This includes all oil containers over 55-gallons, specifically hydraulic units and drums				Cooler, Beach Russ Room, Boiler Room
OC01	Is the container free of visible leaks?				
OC02	Are container labels adequate and visible? (Note: Labels include the name and hazard characteristics of the oil stored inside.)				
OC03	Is container free of rust, corrosion and other damage?				
	Visual inspection of secondary containment: (Note: These items are not applicable to hydraulic units.)				
OC04	Is adequate secondary containment present? (Note: Secondary containment must have a large enough volume to contain the entire contents of the largest container within.)				
OC05	Is containment free of cracks, corrosion and other damage?				
ADDITIONAL COMMENTS:					

Glenn Safety Office
Form Revised 12/06/2000 ~~000~~ 05/17/06
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